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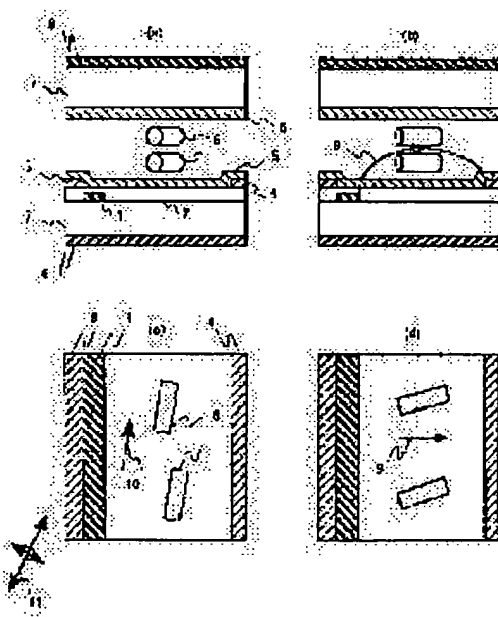
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(54) ACTIVE MATRIX TYPE LIQUID CRYSTAL DISPLAY DEVICE

(57)Abstract:

PURPOSE: To obtain a device having a wide visual field angle and high opening rate by adopting a structure in which electrodes for driving liquid crystals are held by ≥2 layers of upper and lower dielectric layers exclusive of the liquid crystal layer for the electrodes for driving liquid crystals and specifying the specific resistance of the liquid crystals to a specific range.

CONSTITUTION: The wire-shaped electrodes 1, 3, 4 are formed on the inner side of a pair of transparent substrates and orientation control films 5 are applied thereon and are subjected to an orientation treatment. A liquid crystal compsn. is clamped between a pair of the substrates. The bar-shaped liquid crystal molecules 6 are so oriented as to have some angle with the longitudinal direction of the striped electrodes 1, 3, 4 at the time of non-impression of an electric field. Changing of light transmittance by impression of the electric field 9 is made possible by arranging polarizing plates 8 at a prescribed angle 11. The structure in which the electrodes for driving liquid crystals are held by ≥2 layers of the upper and lower dielectric layers exclusive of the liquid crystal layer is adopted for the electrodes for driving the liquid crystals. The specific resistance of the liquid crystals is specified to $\leq 1 \times 10^{14}$ to $\geq 1 \times 10^9 \Omega \cdot \text{cm}$. The opening rate is increased by specifying the specific resistance of the liquid crystals to $\leq 1 \times 10^{14} \Omega \cdot \text{cm}$ such a manner.



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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

 CLAIMS

[Claim(s)]

[Claim 1] A display pixel is constituted by a scanning signal electrode, a video-signal electrode, a pixel electrode, and the active element on a substrate. As for this substrate, the orientation film of liquid crystal is formed through direct or the insulating layer. This substrate counters with another [in_ which the orientation film of liquid crystal was formed] transparent substrate, and is arranged. A liquid crystal layer is pinched by both the aforementioned substrates, and each aforementioned electrode is constituted so that electric field parallel to the aforementioned substrate can be substantially impressed to the aforementioned liquid crystal layer. Each aforementioned electrode is connected with the external-control means which can control impression electric field arbitrarily according to a display pattern. It is the active matrix liquid crystal display equipped with a polarization means to change an optical property according to the orientation state of the aforementioned liquid crystal layer. Active matrix liquid crystal display characterized by being the structure where the aforementioned electrode for driving liquid crystal is pinched by the dielectric layer more than a vertical bilayer, and the specific resistance of liquid crystal being 1×10^{14} or less ohm-cm and 1×10^9 ohm-cm or more.

[Claim 2] A display pixel is constituted by a scanning signal electrode, a video-signal electrode, a pixel electrode, and the active element on a substrate. As for this substrate, the orientation film of liquid crystal is formed through direct or the insulating layer. This substrate counters with another [in_ which the orientation film of liquid crystal was formed] transparent substrate, and is arranged. A liquid crystal layer is pinched by both the aforementioned substrates, and each aforementioned electrode is constituted so that electric field parallel to the aforementioned substrate can be substantially impressed to the aforementioned liquid crystal layer. Each aforementioned electrode is connected with the external-control means which can control impression electric field arbitrarily according to a display pattern. It is the active matrix liquid crystal display equipped with a polarization means to change an optical property according to the orientation state of the aforementioned liquid crystal layer. the ratio of the inter-electrode gap l and the cell gap d -- l/d -- 2.0 the above -- it is -- elastic coefficient K_2 of the twist Active matrix liquid crystal display characterized by using liquid crystal with the relation between dielectric anisotropy $\Delta\epsilon$ which fills (several 1).

$K_2/\Delta\epsilon < 9.0 \times 10^{-8}$ [dyn] -- (several 1)

[Claim 3] Active matrix liquid crystal display given in claim dyadic characterized by for the gap between the substrates which counter being 6 micrometers or less, for an inter-electrode gap being 10 micrometers or more, and driver voltage being less than 5V].

[Claim 4] Claim 1 term characterized by including the liquid crystal compound with which a cyano group, a trifluoromethyl machine, a triffe RUORO methoxy machine, or at least one nitro group was introduced as an end group into the aforementioned liquid crystal, and which is expressed with a general formula (I), and active matrix liquid crystal display given in dyadic.

[Formula 1]

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(In a general formula (I), X1-X3 express a fluoro machine, a cyano group, a trifluoromethyl machine, a triffe RUORO methoxy machine, a nitro group, or a hydrogen atom.) R expresses the alkyl group or alkoxy group of carbon numbers 1-10 which may be replaced. Ring A expresses a cyclohexane ring, the benzene ring, a dioxane ring, a pyrimidine ring, or a [2, 2, 2]-bicyclo octane ring, Z expresses single bond, ester combination, ether linkage or a methylene, MECHIRENOKISHI, and ethylene, and n is the integer of 1 or 2

[Claim 5] Claim 1 term characterized by including the liquid crystal compound with which a cyano group, a trifluoromethyl machine, a triffe RUORO methoxy machine, or at least one nitro group was introduced in the direction of a molecule minor axis into the aforementioned liquid crystal, and which is expressed with a general formula (II), and active matrix liquid crystal display given in dyadic.

[Formula 2]

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(In a general formula (II), X1 and X2 express a fluoro machine, a cyano group, a trifluoromethyl machine, a truffle RUORO methoxy machine, a nitro group, or a hydrogen atom.) R expresses the alkyl group or alkoxy group of carbon numbers 1-10 which may be replaced. Ring A expresses a cyclohexane ring, the benzene ring, a dioxane ring, a pyrimidine ring, or a [2, 2, 2]-bicyclo octane ring, Z expresses single bond, ester combination, ether linkage or a methylene, MECHIRENOKISHI, and ethylene, and n is the integer of 1 or 2

[Claim 6] Claim 1 term which the dielectric anisotropy of liquid crystal is positive, and the dielectric anisotropy of liquid crystal is negative or it set the rubbing angle as 1 degree - 20 degrees, and is characterized by setting a rubbing angle as 1 degree - 20 degrees to the direction of electric field to the direction of a normal of electric field, and active matrix liquid crystal display given in dyadic.

[Claim 7] Claim 1 term characterized by having been constituted as a part whose common electrode is a display pixel, and impressing an alternating current to this common electrode, and active matrix liquid crystal display given in dyadic.

[Claim 8] Claim 1 term characterized by shifting 1 degrees or more of transparency shafts of a polarizing plate in the direction which the molecule shaft of liquid crystal rotates by electric-field impression to the direction of initial orientation of liquid crystal, and active matrix liquid crystal display given in dyadic.

[Translation done.]